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10/762,114	01/21/2004	Peter L. Kellerman	02-IMP-005	3916

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EXAMINER	
DHINGRA, RAKESH KUMAR	
ART UNIT	PAPER NUMBER
1763	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/25/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/762,114	Applicant(s) KELLERMAN ET AL.	
	Examiner Rakesh K. Dhingra	Art Unit 1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10/20/06*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,10-18,38-41,45 and 54-61* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,10-18,38-41,45 and 54-61* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

Claims 15, 58 recite the limitation "extraction apertures of the other extraction electrodes" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Response to Arguments

Applicant's arguments, see pages 15-23 filed 05/8/06, with respect to the rejection(s) of claim(s) 1, 10-18, 38-41, 45, and 54-61 under 35 USC 102 (b) and 35 USC 103 (a) have been fully considered and response is given as follows:

1) Regarding claims 1, 45: Applicant's argument regarding lack of motivation to combine Ennis with Murrell in the light of Ennis apparatus not using mass analysis system which is used in the apparatus of Murrell, and impossibility of concurrent implantation with contact formation is found persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made as explained hereunder.

New reference has been found (US Patent No. 6,716,727 – Walther) that when combined with Murrell et al reads on limitations of claims 1, 45. Additionally claims 1, 45 have also been rejected using new references [(US Patent No. 6,841,789 – Koh et al) and Ito et al (US Patent No. 7,064,049 – Ito et al)] that when combined read on limitations of claims 1, 45. Accordingly claims 1, 45 have been rejected under 35 USC 103 (a) as explained below.

2) Regarding Claims 17, 18, 38-41, 60, 61: Applicant's clarification regarding interstitial pumping apertures being different from extraction apertures in the claims, and the Kellog reference not teaching the same is found persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made using a new reference (US Patent No. 3,961,103 – Aisenberg) by combining with with Murrell, Walther and Lob as explained below.

3) Remaining claims 10-16, 54-59 have also been rejected under 35 USC 103 (a) as explained below.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murrell et al (US PGPUB No. 2003/0197129) in view of Walther (US Patent No. 6,716,727).

Regarding Claims 1,45: Murrell et al teach an ion implantation apparatus (Figures 1-4) comprising:

a plasma source 10 operable to generate source gas ions within a chamber (mounted in a housing 11);

extraction assembly 14a, 14b associated with the top portion of the chamber and operable to extract ions from the top portion thereof.

a workpiece support structure associated with the top portion of the chamber (through intervening parts like analyzing magnet 16 etc) for holding wafer 22 (workpiece) held in housing 19 (chamber);

Murrell et al do not teach the workpiece support operable to secure the workpiece having an implantation surface facing downwards towards the extraction assembly.

Walther teaches an apparatus (Figures 1A, 1B, 2, 3) comprising an ion implant module 140, plasma doping module 110 and a platen 76 that supports a wafer 72 that can be oriented vertically (for implanting) or horizontally (for plasma doping) depending upon the process to be carried out. Further,

orientation of substrate (including substrate facing downwards) would also depend upon process considerations like control of particles to minimize contamination etc (column 4, line 5 to column 6, line 65).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to configure the wafer orientation as taught by Walther in the apparatus of Murrell et al, as per type of process to be conducted and as per process limitations like type of gases used, control of particles to minimize contamination etc.

Further, courts have held (Case law):

" Rearrangement of parts was held to have been obvious. *In re Japikse* 86 USPQ 70 (CCPA 1950)."

Claims 10-13, 15, 16, 54-56, 58, 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murrell et al (US PGPUB No. 2003/0197129) in view of Walther (US Patent No. 6,716,727) as applied to Claim 1 and further in view of Lob et al (US Patent No. 5,036,252).

Regarding Claims 10, 54: Murrell et al in view of Walther teach all limitations of the claim including plurality of extraction electrodes 14a, 14b and operable to extract the ions vertically from the top of the chamber (Murrell et al – Figure 1).

Murrell et al in view of Walther do not teach plurality of extraction electrodes that are vertically oriented with respect to one another.

Lob discloses an ion beam source (Figures 1, 3) that includes a plasma chamber 1 and an extraction assembly comprising a plurality of extraction electrodes vertically oriented with respect to one another and operable to extract the ions vertically from the top portion of the chamber (Fig 1 Item 6-10 and Column 5, Lines 66-68 and Column 6, Lines 1-4).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use extraction electrode configuration as taught by Lob et al in the apparatus of Murrell et al in view of Walther to extract and focus the ion beam from the ionization chamber and to accelerate the same for focusing on the wafer surface (column 7, lines 10-20).

Regarding Claims 11, 55: Lob discloses a first extraction electrode (Fig 1 Item 6-10 Column 5 Lines 66-68 and Column 6 Lines 1-4) of the plurality of extraction electrodes is closest to the plasma within the chamber and comprises a plurality of extraction apertures extending there-through (Fig 1 Item 6 Column 5 Lines 66-68 and Column 6 Lines 1-4).

Regarding Claims 12, 56: Lob discloses that the plurality of extraction apertures extends through the first extraction electrode (Fig 1 Item 6-10 Column 5 Lines 66-68 and Column 6 Lines 1-4) collectively have an area associated therewith and wherein a ratio of the area to the total area exposed to plasma defines a transparency, and wherein the transparency is less than 50% (Column 9 Lines 60-68).

Regarding Claim 13: Lob discloses the transparency of the first extraction electrode is about 10% (Column 9 Lines 60-68).

Regarding Claims 15, 58: Lob discloses that the extraction apertures of the first extraction electrode each have an area and wherein extraction apertures of the other extraction electrodes are substantially aligned with the first extraction electrode extraction apertures, respectively (Figures 1, 5 and Column 9 Lines 50-57).

Regarding Claims 16, 59: Lob teaches that extraction apertures of electrode 8 are greater than those of electrode 6. Lob also teaches that apertures in electrode 6 could be made smaller (implying that extraction apertures of electrode 7 could also be greater than that of electrode 6 (column 9, lines 60-68).

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Murrell et al (US PGPUB No. 2003/0197129) in view of Walther (US Patent No. 6,716,727) and Lob et al (US Patent

No. 5,036,252) as applied to Claim 12 and further in view of Okamoto et al (US patent No. 4,963,735).

With respect to Claim 14: Murrell et al in view of Walther and Lob teach all limitations of the claim except cooling of extraction electrodes.

Okamoto et al discloses an ion beam plasma source (Figures 1, 2b) that includes a discharge tube 10 and extractor electrode 110 that are cooled (column 3, lines 15-35)

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use cooling of extraction electrode as taught by Okamoto et al in the apparatus of Murrell et al in view of Walther and Lob to enable control temperature of plasma source and obtain proper focusing of the ion beam.

Claims 17,18, 38-41, 60, 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murrell et al (US PGPUB No. 2003/0197129) in view of Walther (US Patent No. 6,716,727) and Lob (US patent No. 5,036,252) as applied to Claims 11, 55 and further in view of Aisenberg (US patent No. 3,961,103).

Regarding Claims 17, 18, 60,61: Murrell et al in view of Walther and Lob teach all limitations of the claim except interstitial pumping apertures in extraction electrode.

Aisenberg teaches an apparatus (Figure 1) comprising an ion source 10 with chamber 11 and extraction electrode 24 and constrictor electrode 26 which have apertures (interstitial pumping apertures) that permit differential pumping to enable reduced pressure near extraction electrode and external to in source chamber (column 3, line 40 to column 4, line 15). Further size of interstitial pumping apertures would be dependent upon the pressure differential to be maintained between the ion source chamber and near the extraction electrode, as per process limitations.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use interstitial pumping apertures in extraction electrode as taught by Aisenberg in the apparatus of Murrell et al in view of Walther and Lob to maintain differential pumping between the ion source chamber and near the extraction electrode,

Regarding Claim 38: Murrell et al in view of Walther and Lob teach all limitations of the claim (as explained above under claims 1, 17, 18) including a plasma source operable to generate ions within a chamber having a first pressure (Fig 1 Item 1 Column 5 Lines 66-68 and Column 6 Lines 1-4 and an extraction assembly disposed between the chamber and the workpiece support structure (Fig 1 Item 6-10 Column 5 Lines 66-68 and Column 6 Lines 1-4), the extraction assembly comprising a plurality of electrodes (column 7, line 10 to column 8, line 30). Additionally, Aisenberg teaches interstitial pumping apertures in extraction electrode to enable differential pumping (as explained above under claims 17, 18). Further, claim limitation regarding generation of oxygen ions by the plasma source is a functional limitation and since the apparatus of prior art meets all the structural limitations of the claim, the same is considered capable of meeting this functional limitation.

Regarding Claim 39: Lob discloses that the extraction assembly further comprises a ground electrode (Fig 1 Item 10 Column 5 Lines 66-68 and Column 6 Lines 1-4) disposed between the extraction electrode (Fig 1 Item 7 Column 5 Lines 66-68 and Column 6 Lines 1-4) and the workpiece support structure (Fig 1 Item Substrate Column 5 Lines 66-68 and Column 6 Lines 1-4), and wherein the ground electrode is biased at a voltage of the workpiece support structure that is biased negatively with respect to the plasma within the chamber (Fig 1 Item 10 Column 7 Lines 26-52). Further Aisenberg teaches interstitial pumping apertures in extraction electrode to enable differential pumping (as explained above under claims 17, 18) above.

Regarding Claim 40: Lob discloses that the extraction assembly further comprises a suppression electrode (Fig 1 Item 9 Column 5 Lines 66-68 and Column 6 Lines 1-4) disposed between the ground

electrode (Fig 1 Item 10 Column 5 Lines 66-68 and Column 6 Lines 1-4) and the extraction electrode (Fig 1 Item 7 Column 5 Lines 66-68 and Column 6 Lines 1-4), the suppression electrode biased negatively with respect to the ground electrode, and operable to prevent electrons local to the workpiece support structure from entering the extraction assembly (Fig 1 Item 9 Column 7 Lines 26-52), wherein the suppression electrode comprises a plurality of extraction apertures substantially aligned to the plasma electrode extraction apertures (Fig 1 Item 6 and 9 Column 9 Lines 50-57). Further, Aisenberg teaches suppression electrode comprising one or more interstitial pumping apertures.

Regarding Claim 41: Lob discloses that the extraction assembly further comprising an auxiliary electrode (Fig 1 Item 8 Column 5 Lines 66-68 and Column 6 Lines 1-4) disposed between the extraction electrode (Fig 1 Item 7 Column 5 Lines 66-68 and Column 6 Lines 1-4) and the suppression electrode (Fig 1 Item 9 Column 5 Lines 66-68 and Column 6 Lines 1-4), wherein the auxiliary electrode is biased negatively with respect to the extraction electrode and positively with respect to the suppression electrode (Fig 1 Item 8 Column 7 Lines 26-52).

Claim 57 is rejected under 35 U.S.C. 103(a) as being unpatentable over Murrell et al (US PGPUB No. 2003/0197129) in view of Walther (US Patent No. 6,716,727) and Lob et al (US Patent No. 5,036,252) as applied to Claim 56 and further in view of Okamoto et al (US patent No. 4,963,735).

With respect to Claim 57: Murrell et al in view of Walther and Lob teach all limitations of the claim except cooling of extraction electrodes.

Okamoto et al discloses an ion beam plasma source (Figures 1, 2b) that includes a discharge tube 10 and extractor electrode 110 that are cooled (column 3, lines 15-35)

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use cooling of extraction electrode as taught by Okamoto et al in the apparatus of Murrell et

al in view of Walther and Lob to enable control temperature of plasma source and obtain proper focusing of the ion beam.

Claims 1, 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koh et al (US Patent No. 6,841,789) in view of Ito et al (US Patent No. 7,064,049).

Regarding Claim 1: Koh et al teach an ion beam apparatus (Figures 1-3) comprising:

an ion source 210 operable to generate source gas ions within a chamber;

a workpiece support 230 associated with top portion of the chamber and holding a substrate 200 in a process chamber with its implantation surface facing downwards (column 1, line 50 to column 2, line 20 and column 5, lines 1-55). Though Koh et al do not expressely teach extraction electrodes with the ion source that would face the substrate 200, it is known in the art that extraction electrodes are disposed near the exit of ion source chamber, as also indicated in the example below.

Koh et al do not expressly teach that the ion source is a plasma source and an extraction assembly associated with top portion of the chamber.

Ito et al teach an ion implantation apparatus (Figure 1) comprising a plasma ion source 5, an extraction assembly 8, 9 associated with top portion of chamber operable to extract ions from top portion of chamber (column 4, line 35-65).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use an arc discharge to generate plasma as taught by Ito et al in the apparatus of Koh et al to achieve high through-put without requiring enlargement of the ion source (column 2,lines 37-45).

Claims 10-13, 15, 16, 54-56, 58, 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koh et al (US Patent No. 6,841,789) in view of Ito et al (US Patent No. 7,064,049) as applied to Claim 1 and further in view of Lob et al (US Patent No. 5,036,252).

Regarding Claims 10, 54: Koh et al et al in view of Ito et al teach all limitations of the claim including plurality of extraction electrodes 14a, 14b and operable to extract the ions vertically from the top of the chamber (Murrell et al – Figure 1).

Koh et al in view of Ito et al do not teach plurality of extraction electrodes that are vertically oriented with respect to one another.

Lob discloses an ion beam source (Figures 1, 3) that includes a plasma chamber 1 and an extraction assembly comprising a plurality of extraction electrodes vertically oriented with respect to one another and operable to extract the ions vertically from the top portion of the chamber (Fig 1 Item 6-10 and Column 5, Lines 66-68 and Column 6, Lines 1-4).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use extraction electrode configuration as taught by Lob et al in the apparatus of Koh et al in view of Ito et al to extract and focus the ion beam from the ionization chamber and to accelerate the same for focusing on the wafer surface (column 7, lines 10-20).

Regarding Claims 11, 55: Lob discloses a first extraction electrode (Fig 1 Item 6-10 Column 5 Lines 66-68 and Column 6 Lines 1-4) of the plurality of extraction electrodes is closest to the plasma within the chamber and comprises a plurality of extraction apertures extending there-through (Fig 1 Item 6 Column 5 Lines 66-68 and Column 6 Lines 1-4).

Regarding Claims 12, 56: Lob discloses that the plurality of extraction apertures extends through the first extraction electrode (Fig 1 Item 6-10 Column 5 Lines 66-68 and Column 6 Lines 1-4) collectively have an area associated therewith and wherein a ratio of the area to the total area exposed to plasma defines a transparency, and wherein the transparency is less than 50% (Column 9 Lines 60-68).

Regarding Claim 13: Lob discloses the transparency of the first extraction electrode is about 10% (Column 9 Lines 60-68).

Regarding Claims 15, 58: Lob discloses that the extraction apertures of the first extraction electrode each have an area and wherein extraction apertures of the other extraction electrodes are substantially aligned with the first extraction electrode extraction apertures, respectively (Figures 1, 5 and Column 9 Lines 50-57).

Regarding Claims 16, 59: Lob teaches that extraction apertures of electrode 8 are greater than those of electrode 6. Lob also teaches that apertures in electrode 6 could be made smaller (implying that extraction apertures of electrode 7 could also be greater than that of electrode 6 (column 9, lines 60-68).

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Koh et al (US Patent No. 6,841,789) in view of Ito et al (US Patent No. 7,064,049) and Lob et al (US Patent No. 5,036,252) as applied to Claim 12 and further in view of Okamoto et al (US patent No. 4,963,735).

With respect to Claim 14: Koh et al et al in view of Ito et al and Lob teach all limitations of the claim except cooling of extraction electrodes.

Okamoto et al discloses an ion beam plasma source (Figures 1, 2b) that includes a discharge tube 10 and extractor electrode 110 that are cooled (column 3, lines 15-35)

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use cooling of extraction electrode as taught by Okamoto et al in the apparatus of Koh et al et al in view of Ito et al and Lob to enable control temperature of plasma source and obtain proper focusing of the ion beam.

Claims 17,18, 38-41, 60, 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koh et al (US Patent No. 6,841,789) in view of Ito et al (US Patent No. 7,064,049) and Lob (US patent No. 5,036,252) as applied to Claims 11, 55 and further in view of Aisenberg (US patent No. 3,961,103).

Regarding Claims 17, 18, 60,61: Koh et al et al in view of Ito et al and Lob teach all limitations of the claim except interstitial pumping aperture in extraction electrode.

Aisenberg teaches an apparatus (Figure 1) comprising an ion source 10 with chamber 11 and extraction electrode 24 and constrictor electrode 26 which have apertures (interstitial pumping apertures) that permit differential pumping to enable reduced pressure near extraction electrode and external to in source chamber (column 3, line 40 to column 4, line 15). Further size of interstitial pumping apertures would be dependent upon the pressure differential to be maintained between the ion source chamber and near the extraction electrode, as per process limitations.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use interstitial pumping apertures in extraction electrode as taught by Aisenberg in the apparatus of Koh et al et al in view of Ito et al and Lob to maintain differential pumping between the ion source chamber and near the extraction electrode,

Regarding Claim 38: Koh et al et al in view of Ito et al and Lob teach all limitations of the claim (as explained above under claims, 17, 18) including a plasma source operable to generate ions within a chamber having a first pressure (Fig 1 Item 1 Column 5 Lines 66-68 and Column 6 Lines 1-4 and an extraction assembly disposed between the chamber and the workpiece support structure (Fig 1 Item 6-10 Column 5 Lines 66-68 and Column 6 Lines 1-4), the extraction assembly comprising a plurality of electrodes (column 7, line 10 to column 8, line 30). Additionally, Aisenberg teaches interstitial pumping apertures in extraction electrode to enable differential pumping (as explained above under claims 17, 18). Further, claim limitation regarding generation of oxygen ions by the plasma source is a functional limitation and since the apparatus of prior art meets all the structural limitations of the claim, the same is considered capable of meeting this functional limitation.

Regarding Claim 39: Lob discloses that the extraction assembly further comprises a ground electrode (Fig 1 Item 10 Column 5 Lines 66-68 and Column 6 Lines 1-4) disposed between the extraction

electrode (Fig 1 Item 7 Column 5 Lines 66-68 and Column 6 Lines 1-4) and the workpiece support structure (Fig 1 Item Substrate Column 5 Lines 66-68 and Column 6 Lines 1-4), and wherein the ground electrode is biased at a voltage of the workpiece support structure that is biased negatively with respect to the plasma within the chamber (Fig 1 Item 10 Column 7 Lines 26-52). Further Aisenberg teaches interstitial pumping apertures in extraction electrode to enable differential pumping (as explained above under claims 17, 18) above.

Regarding Claim 40: Lob discloses that the extraction assembly further comprises a suppression electrode (Fig 1 Item 9 Column 5 Lines 66-68 and Column 6 Lines 1-4) disposed between the ground electrode (Fig 1 Item 10 Column 5 Lines 66-68 and Column 6 Lines 1-4) and the extraction electrode (Fig 1 Item 7 Column 5 Lines 66-68 and Column 6 Lines 1-4), the suppression electrode biased negatively with respect to the ground electrode, and operable to prevent electrons local to the workpiece support structure from entering the extraction assembly (Fig 1 Item 9 Column 7 Lines 26-52), wherein the suppression electrode comprises a plurality of extraction apertures substantially aligned to the plasma electrode extraction apertures (Fig 1 Item 6 and 9 Column 9 Lines 50-57). Further, Aisenberg teaches suppression electrode comprising one or more interstitial pumping apertures.

Regarding Claim 41: Lob discloses that the extraction assembly further comprising an auxiliary electrode (Fig 1 Item 8 Column 5 Lines 66-68 and Column 6 Lines 1-4) disposed between the extraction electrode (Fig 1 Item 7 Column 5 Lines 66-68 and Column 6 Lines 1-4) and the suppression electrode (Fig 1 Item 9 Column 5 Lines 66-68 and Column 6 Lines 1-4), wherein the auxiliary electrode is biased negatively with respect to the extraction electrode and positively with respect to the suppression electrode (Fig 1 Item 8 Column 7 Lines 26-52).

Claim 57 is rejected under 35 U.S.C. 103(a) as being unpatentable over Koh et al (US Patent No. 6,841,789) in view of Ito et al (US Patent No. 7,064,049) and Lob et al (US Patent No. 5,036,252) as applied to Claim 56 and further in view of Okamoto et al (US patent No. 4,963,735).

With respect to Claim 57: Koh et al et al in view of Ito et al and Lob teach all limitations of the claim except cooling of extraction electrodes.

Okamoto et al discloses an ion beam plasma source (Figures 1, 2b) that includes a discharge tube 10 and extractor electrode 110 that are cooled (column 3, lines 15-35)

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use cooling of extraction electrode as taught by Okamoto et al in the apparatus of Koh et al et al in view of Ito et al and Lob to enable control temperature of plasma source and obtain proper focusing of the ion beam.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rakesh K. Dhingra whose telephone number is (571)-272-5959. The examiner can normally be reached on 8:30 -6:00 (Monday - Friday).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571)-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Rakesh Dhingra

Parviz Hassanzadeh
Supervisory Patent Examiner
Art Unit 1763